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(54) Title: MULTI-PURPOSE GAS LIGHTER WITH IGNITION-RESISTANT FUNCTION (57) Abstract A utility lighter (1) with an ignition-resistant mechanism. The ignition-resistant function is performed by a cam mechanism (60) having a hub (61). The hub has three integral projections: the cam lever (80), the fuel-release lever (70), and the return spring (90). Integral to the cam lever is the safety button (120) which when depressed disengages the cam lever (80) from the stopper tab (110) of the trigger (100). The trigger (100) also has an inclined surface (111) below the stopper tab (110) which the cam lever (80) engages after the safety button (120) is depressed and the trigger (100) is pulled. Once the trigger (100) is pulled, the cam lever (80) moves along the inclined surface (111) rotating the cam mechanism (60). When the cam mechanism (60) is rotated the fuel-release lever (70) opens the fuel-release valve (31) allowing fuel to transfer through to the lighting rod (16). When the safety button is released the return spring (90) urges the cam mechanism (60) to rotate back to the initial locked position.		

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Multi-Purpose Gas Lighter with
Ignition-Resistant Function

5

Inventor: Jong-Koo Jon

10 BACKGROUND OF INVENTION

1. Field of the Invention:

This invention relates to generally to utility lighters and more specifically to utility lighters which contain a safety feature making the lighter child-resistant.

15

2. Background Art:

20

Utility lighters are very useful and have become quite prevalent in modern times. Utility lighters of the type described herein generally contain a handle and an elongated lighting rod. The shape and operation of utility lighters allow for several advantages over normal means of producing a flame. Most significantly, due to the elongated nature of the lighting rod, utility lighters enable the operator to stand a safe distance away from the object to be ignited before actuating the lighter, thus avoiding a large number of potential accidents. In addition, utility lighters allow a flame to be produced in hard-to-reach or narrow places, where the human hand

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holding a match would not normally fit. Still, in the hands of children, or others who do not know how to safely and properly operate the lighter, such lighters
5 are as dangerous as any other spark and/or flame-producing device. Therefore, a need has been realized to equip utility lighters with safety features that minimize accidental or improper use by inexperienced
10 persons, especially young children.

Many inventions have been created to address this safety-related concern. Generally, these inventions
15 have sought to introduce safety mechanisms that disable automatic operation of either the spark-generation and/or the fuel-release function of the lighter. For example, some utility lighters provide
20 for a blocking mechanism, where the actuating trigger (33) (Figs. 6 and 7) is blocked from moving the required distance for a spark to be generated. In these lighters, the locking mechanism is normally de-
25 activated by sliding an "on/off" (32) switch to the "on" position, or by other means, so as to remove the impediment from the actuating trigger's operating path.

30 Although utility lighters of the type described above provide some level of safety, there is much room for improvement. Specifically, in these lighters,
35 once the locking means (e.g., the on/off switch) is disabled, the lighter remains in the unlocked state until the locking mechanism is activated again.

Therefore, if the operator disables the locking mechanism in order to use the lighter, and then forgets to re-lock the lighter, the safety feature of
5 the lighter is rendered useless, until the locking mechanism is again activated.

Other inventions have attempted to address the safety-related issues by impeding, not the operation
10 of the trigger, but that of the fuel-release mechanism. Of course, a utility lighter containing such a mechanism would inhibit flame generation in the
15 locked position as no fuel would be released until the locking mechanism has been deactivated. However, in these types of lighters, nothing prevents a spark from being generated. As such, the safety goals are only
20 partially met in these types of lighters since young children handling the lighter could still create fires by operating the lighter in close proximity to a source of fuel or near carpets, paper, or other
25 flammable material.

In order to address the above problems, some inventions have introduced locking mechanisms that are
30 activated automatically after each use of the lighter. As such, in these lighters, two states of operation exist: the locked state and the operable state. In the locked state, neither a spark nor a flame can be
35 generated. In contrast, in the operable state, the lighter is no longer locked, so that a flame can be generated.

Therefore, there is a need for a device that not only achieves the stated safety goals in generating a flame, but also makes it difficult for inexperienced users and/or young children to sustain the flame. The invention described herein offers such a combination. The invention requires that a safety button, protruding generally from the top portion of the lighter housing shell, be depressed simultaneously with a trigger before a flame can be produced.

SUMMARY OF THE INVENTION:

The primary object of this invention is to provide a safety mechanism for utility lighters so that children or inexperienced users will be less likely to inadvertently activate the lighter. Such a safety feature is especially important because young children often play with lighters as toys and because lighters have mechanically moveable parts that make them attractive to children as toys.

Another object of the present invention is to prevent the generation of not only a flame, but even a spark. As noted previously, in a lighter where only the fuel-release mechanism is inhibited in the locked state, young children playing with the lighter can still use the lighter to create sparks. Depending on the child's surroundings, this can lead to the start

of accidental fires if the child is operating the lighter near paper products or any other source of flammable material.

5

A further object of the invention described herein is to provide an improved device for maximizing safety in utility lighters without compromising ease of use.
10 To this end, the addition of a safety button creates a simple additional step which, for the intended user, leaves the operation of the utility lighter as simple
15 as it has always been to operate a regular utility lighter with no safety feature, yet, creates an additional mental step which acts as a deterrent for non-intended users.

20

Another object of this invention is to reduce the risk of unintended fires, especially by young children, by making it impossible for the flame to
25 continue to burn unless two (2) separate functions are performed simultaneously and operation of a trigger is continued without interruption.

30

A final object of the present invention is to meet all of its safety goals while, at the same time, it maximizes ease of manufacturing and minimizes costs
35 associated with manufacturing of parts.

The invention meets its objectives by providing a

cam mechanism that integrates several structural elements. In the preferred embodiment, the cam mechanism consists of a cam lever, a fuel-release lever, and a return spring. Most significantly from a safety standpoint, the cam mechanism contains a cam lever that acts to lock the trigger in the inoperative position. Typically, a young child will attempt to activate the lighter by depressing the trigger only. However, when this is done, the trigger will not move at all or significantly, so that neither a spark nor a flame will be generated. Since the trigger is locked in this position, repeated operation of the trigger by a child will yield the same unsuccessful results.

The only way to activate the lighter is to depress the safety button. When this is done, the cam lever is moved out of the path of the trigger, so that the trigger can now be depressed. Depression of the safety button also causes the fuel-release lever to move, so that, depending on the extent of pressure placed on the safety button, the fuel-release valve may be opened and fuel released. As such, a second significant safety-related feature of the present invention is that a small amount of pressure on the safety button will release the trigger lock. However, such pressure will not release sufficient fuel for a flame to be produced. That is, the most that can happen when the user presses the safety button

slightly, and then depresses the trigger, is that a spark would be generated. To ignite the spark, the user would have to continue pressing the safety button further than is required to release the lock, so that sufficient fuel is released before the trigger is activated and a spark and flame are generated.

The above procedure ensures that even if a child were to be able to momentarily press the safety button to release the lock, he or she would still have trouble creating a flame, as doing so would require further pressure on the safety button. This is a simple, yet effective concept. Nevertheless, it is a concept that a young child operating the lighter must recognize and grasp before he or she can successfully operate the lighter. In most cases, the child either will not recognize the usefulness of the safety button or, if he/she does, he/she will not be able to simultaneously press the safety button far enough to create a flame. As such, the child will most likely abandon the lighter after several unsuccessful attempts.

Once the user no longer needs the flame, the trigger is released. At this point, the return spring in the cam mechanism ensures that the cam lever, the fuel-release lever, and the safety button all return to their original stationary positions, thus also automatically re-locking the trigger in the inoperable

state.

5 As can be understood from the above description,
the invention disclosed herein achieves its safety
objectives without making operation of the lighter any
more cumbersome than a regular utility lighter.
10 Specifically, the safety button is positioned in such
a way that operation of the lighter is very simple in
experienced hands. An adult user familiar with the
operation of utility lighters still needs to use only
15 one finger to sustain the flame. This allows the user
to operate the lighter in a safe, yet non-complicated
manner.

20 The unique structure of the cam mechanism contained
in the present invention provides for an optimum
amount of safety as it makes it very difficult, if not
impossible, for young children to operate the device.
25 Young children are capable of carrying out only simple
mental concepts. As such, a young child wishing to
operate the present invention would attempt to do so in
the usual way, i.e., by pressing the trigger.
30 However, due to the automatic locking mechanism of the
device, the trigger will not move. This alone will
act as a deterrent as most young children will simply
35 abandon the device after several unsuccessful
attempts. This is true because a child operator must
first recognize that both the trigger and the safety

button must be operated simultaneously before a flame can be generated. This is generally too convoluted a concept for young children to grasp or appreciate.

5 Nevertheless, even if a young child were to be able to learn the proper operation of the device, he or she would probably still be unable to actually operate the device. Given the relative location of the trigger
10 and the safety button, operation of the present invention requires that the user be able to grasp the handle of the lighter in his or her hand, operate the
15 trigger with the index finger, and simultaneously operate the safety button with the thumb. This, in turn, requires not only a significant amount of manual dexterity, but also hands that are sufficiently large,
20 namely, adult hands. Moreover, successful operation of the device requires an amount of strength and pulp that are rarely found in the fingers of young children.

25

 In addition, even if a child were to possess the mental capacity for understanding and learning the
30 required process of operation, a large enough hand, and the required amount of manual dexterity, strength, and pulp, so that he or she could somehow generate a flame, he or she would have to recognize a second
35 concept: that the flame will not be sustained unless the trigger is held in its activated state. Again, this is a difficult mental concept for a child to

recognize and learn. Moreover, even if learned, the concept would be difficult for a child to operationalize given the above discussion regarding
5 the mental and physical limitations of young children. On the other hand, an adult user would have no difficulty operating the invention as the device requires no more than the simultaneous operation of
10 two strategically positioned buttons.

In addition to all of the safety advantages
15 described above, the invention described herein offers a significant reduction in cost, and a significant increase in ease, of manufacturing. The cam mechanism is an integrated, one-piece member that performs the
20 functions of at least three (3) separate members in most other utility lighters currently available on the market. Moreover, the entire safety feature, as well as full operation of the device is generally enabled
25 by the manufacture and use in the lighter of two (1) basic elements: the cam mechanism and the safety button. In addition, it is contemplated that these two elements may even be combined, so that only one
30 integrated structural member need be produced. This, of course, would lead to even more significant savings and simplicity in the manufacturing process.

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This and other advantages of the present invention will become more apparent through the following

description of the drawings and detailed description of the preferred embodiment.

5

BRIEF DESCRIPTION OF THE DRAWINGS:

Fig. 1 is a perspective view of the preferred embodiment of the invention;

10 Fig. 2 is a sectional view of the preferred embodiment of the invention;

Fig. 3 is an exploded view of the preferred embodiment;

15 Fig. 4 is a cross-sectional view of the preferred embodiment;

Fig. 5 is a cross-sectional view of the preferred embodiment during operation;

20 Fig. 6 is a perspective view of a prior art lighter; and

Fig. 7 is a cross-sectional view of a prior art
25 lighter.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT:

A general description of the piezoelectric utility
30 lighter (1) (Fig. 1) will be provided before presenting a detailed description of the improvement in the safety feature that constitutes the invention.

35 Generally, the elements of the utility lighter (1) include a lighter housing (10), a lighting rod (16)

attached to the forward end of the lighter housing via engagement means (not shown), a support ring which slides over the overlapping portions of the lighter housing and lighting rod, a fuel tank (30) (Figs. 2 and 3), a piezoelectric unit (40), a cam-support pin (50), a cam mechanism (60), a fuel-release lever (70), a cam lever (80), a return spring (90), a trigger (100), a stopper (110), and a safety button (120).

The lighter housing (10) is comprised of two shells, cut along the longitudinal axis of the lighter (1). The lighter housing (10) has a back end and a forward end, where the forward end is equipped with engagement means (not shown) to engage a lighting rod (16). The lighting rod, which typically has a cylindrical cross section, has a free end which constitutes the tip of the lighter (1) and an engagement end which connects to the forward end of the lighter housing. Where the forward end of the lighter housing and the engagement end of the lighting rod overlap, there is provided a support ring (not shown) which slides over and maintains the lighter housing-lighting rod combination.

The lighter (1) is equipped with a fuel tank (30). A fuel-release valve (31) is attached to the fuel tank. This valve is spring loaded so that it is normally urged to the closed position. The valve is also provided with a gas tube (32) which extends through the lighting rod and to a discharge nozzle

(not shown) at the free end of the lighting rod. The valve is opened via the operation of a fuel-release lever (70).

5 The next element of the lighter (1) is a piezoelectric unit (40). The upper section of the piezoelectric unit (40) constitutes the sliding
10 section (41). The sliding section (41) has a contact surface (42) that is in contact the trigger (100). Operation of the piezoelectric unit (40) creates an electric discharge that is carried to the free end of
15 the lighting rod via a wire (not shown).

One of the primary elements of the safety-related invention is a cam mechanism (60). The cam mechanism has a hub (61), as well as three projections that
20 extend in generally different directions. These projections are: a fuel release lever (70), a cam lever (80), and a return spring (90).

25 The cam mechanism is held in place by a cam-support pin (50). The cam-support pin (50) is a projection that extends from the inner surface of one of the lighter housing shells in a direction that is
30 perpendicular to the longitudinal axis of the lighter (1). The hub (61) of the cam mechanism (60) fits unto and is supported by the cam-support pin (50).

35 The fuel-release lever (70) is connected to the valve (31) by a C-shaped notch (71) in the fuel release lever, and has an opposing end that is integral with the hub (61) of the cam mechanism (60).

The cam lever (80) has one end that is integral with the hub (61) of the cam mechanism (60) and an opposing free end that constitutes the cam-lever edge (81).
5 The return spring (90) also has one end that is integral with the hub (61) of the the cam mechanism (60).

10 The next primary element is the trigger (100). The trigger (100) is slidably mounted between the two shells of the lighter housing (10). As in conventional utility lighters, the trigger (100) is
15 allowed to slide back and forth along the longitudinal axis of the lighter (1). The trigger (100) has an operation section (101) that protrudes from the lighter housing (10) so as to be operated by a finger
20 of the user. Generally, the operation section (101) has a surface that is slightly curved so as to appear concave. However, the invention described herein is
25 amenable to different degrees of curvature for the operation section (101) of the trigger (100).

The trigger (100) also has an undersurface that makes contact with the contact surface (42) of the
30 sliding section (41) of the piezoelectric unit (40). In addition, the trigger (100) has a trigger tab (103) and a stopper tab (110). The trigger tab (103) is a projection that makes contact with the upper surface
35 of the cam lever (80). The stopper tab (110) is typically placed underneath the trigger tab (103) and

engages the cam-lever edge (81).

The next primary element is a safety button (120). The safety button (120) is slidably fitted within the top surface of the lighter housing shell and has an operation section (121). The safety button is integral with the cam lever (80), and the safety button is connected substantially at a midpoint of the cam lever. The safety button (120) has a C-shaped notch (122), which allows the fuel tube to pass by the safety button

In the preferred embodiment, the primary elements of the safety-related invention described herein, as well as the interaction between these and the other, more conventional, elements of the utility lighter can be further defined as follows.

In the preferred embodiment, the hub (61) (Figs. 4 and 5) of the cam mechanism (60) is fitted unto and supported by the cam-support pin (50), so that the hub (61) is capable of rotating around the cam-support pin (50). In order to operate the lighter (1), the user must press the trigger (100) to create a spark, and release fuel so that a flame can be generated. However, when the user attempts to press the trigger (100), the trigger will not move significantly or at all.

In the inoperable state, the trigger tab (103) is in contact with the upper surface of the cam lever

(80). The trigger (100) has a stopper tab (110) that engages the cam-lever edge (81). This acts as a locking mechanism which must be released before the trigger can be moved. To release the lock, the user must press the safety button (120) by pushing on the safety button operation section (121). When the safety button (120) is depressed, the motion of the safety button (120) is translated to the cam lever (80) disengaging the cam-lever edge (81) from the stopper tab (110), and resistance is provided by the return spring (90).

The cam lever (80) moves, so that its cam-lever edge (81) is disengaged from the stopper tab (110), once they are disengaged the trigger (100) can be pulled. Once the trigger is pulled the cam-lever edge contacts the inclined surface (111), and as the cam-lever edge moves along the inclined surface, the cam mechanism continues to rotate and opens the fuel-release valve (31).

With the locking mechanism disengaged, the user can now press the trigger (100) in order to create a spark. As the operation section (101) of the trigger (100) is pushed, the undersurface (102) of the trigger (100) contacts the contact surface (42) of the sliding section (41) of the piezoelectric unit (40). In this way, as the trigger (100) is activated, so is the piezoelectric unit (40), so that a spark is generated when the sliding section (41) has moved back far

enough.

This, in turn, causes further rotation of the hub
(61), which causes the fuel-release lever (70) to open
5 the fuel-release valve (31) and release fuel. Once
the flame is no longer needed, the trigger (100) is
released. This allows both the cam lever (80) and the
10 fuel-release lever (70) to return to their stationary
positions under the urging influence of return spring
(90). Once in this position, the cam-lever edge (81)
again engages the stopper tab (110), thereby
15 automatically re-locking the lighter.

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I Claim:

- 5 1. A utility lighter (1) comprising:
a lighting rod (16), having a cylindrical shape and
having an engagement end and a free end;
a lighter housing (10), having a back end, a
10 forward end, and an inner surface, the forward end
equipped with means for engaging the lighting rod
(16);
a trigger (100) for operating the lighter, slidably
15 mounted to the lighter housing (10), the trigger
having a stopper tab (110) and an inclined surface
(111);
a fuel tank (30), having a fuel-release valve (31);
20 the fuel-release valve being spring loaded so as to
urge the valve into a closed position;
a fuel tube (not shown) connected to the fuel tank
25 (30) for transferring fuel from the fuel tank through
the lighting rod (16);
a piezoelectric unit (40) for creating a spark,
having a contact surface (42) which abuts the trigger
30 (100), the piezoelectric unit being located between
the fuel tank and the trigger;
a cam mechanism (60) having a hub (61) and three
projections extending in different directions, the
35 three projections being a fuel-release lever (70), a
cam lever (80), and a return spring (90);

a cam-support pin (50) for supporting the hub (61) of the cam mechanism (60), the cam support pin projecting from the inner surface of the lighter housing (10) in a direction perpendicular to the longitudinal axis of the lighter;

the fuel-release lever (70) having a first and a second end, the first end is connected to the fuel-release valve (31) and the second end is integral to the cam mechanism (60);

the cam lever (80) having a first and a second end, the first end is integral to the hub (61) of the cam mechanism (60), the second end engages the stopper tab (110) of the trigger (100) to prevent operation of the trigger;

the return spring (90) having a first end being integral to the hub (61) of the cam mechanism (60), the return spring also having a top surface and a bottom surface, the bottom surface in contact with the inner surface of the lighter housing (10);

a safety button (120) having a first end and a second end, the first end is integral to the hub (61) of the cam mechanism (60), and the second end being an operation section (121) that protrudes from the lighter housing (10) whereby depression of the safety button (120) rotates the cam mechanism (60) and as a result disengages the cam lever (80) from the stopper tab (110) as the trigger (100) is pulled the second end of the cam lever slides along the inclined surface

(111) of the trigger further rotating the hub (61) of the cam mechanism (60) thereby opening the fuel-release valve (31).

5

2. The utility lighter of claim 1, wherein the cam lever (80) being longer than the return spring (90).

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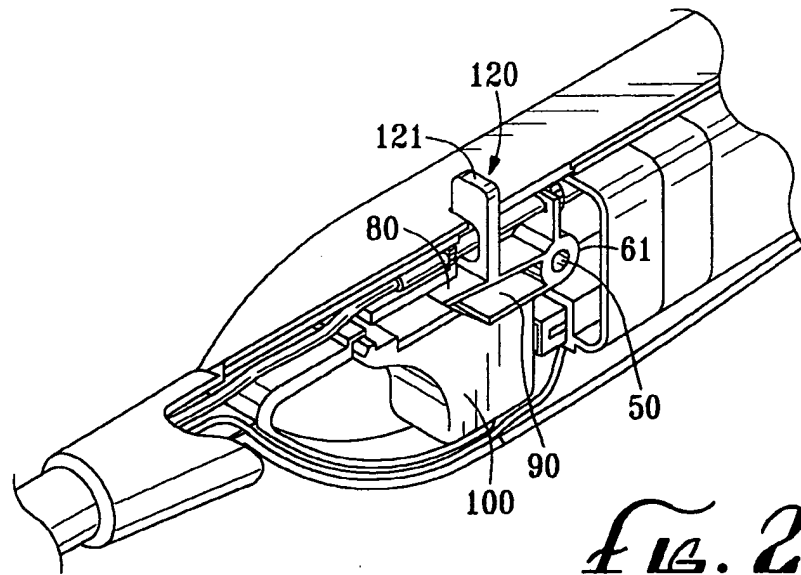
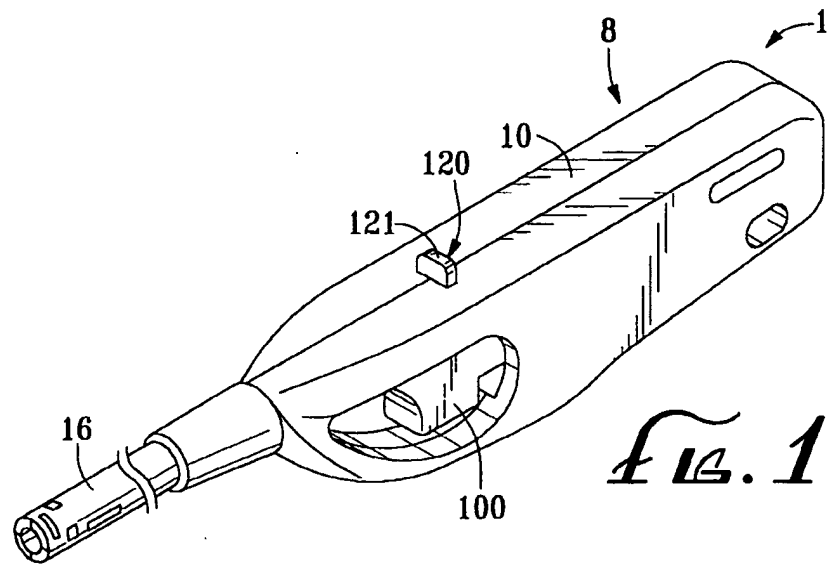
15 3. The utility lighter of claim 1, wherein the fuel release lever (70) and the safety button (120) both have C-shaped notches (71 and 122) respectively for creating a space for the fuel tube (not shown) to pass
20 through.

25 4. The utility lighter of claim 3, wherein the C-shaped notches (71 and 122) face the same direction thereby simplifying the structural assembly of the lighter.

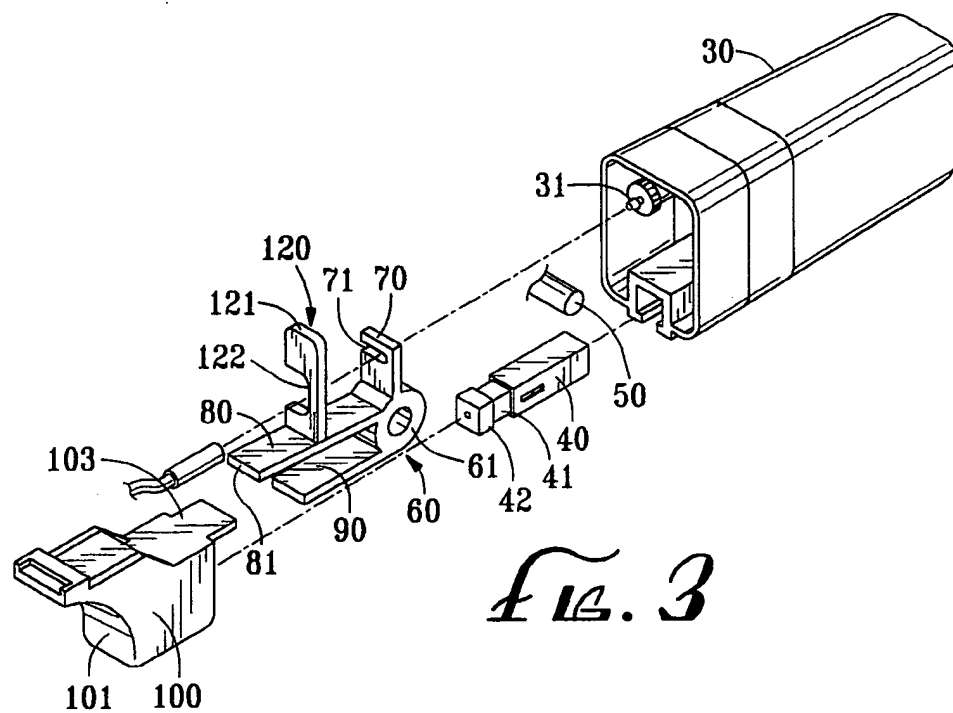
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*FIG. 3*

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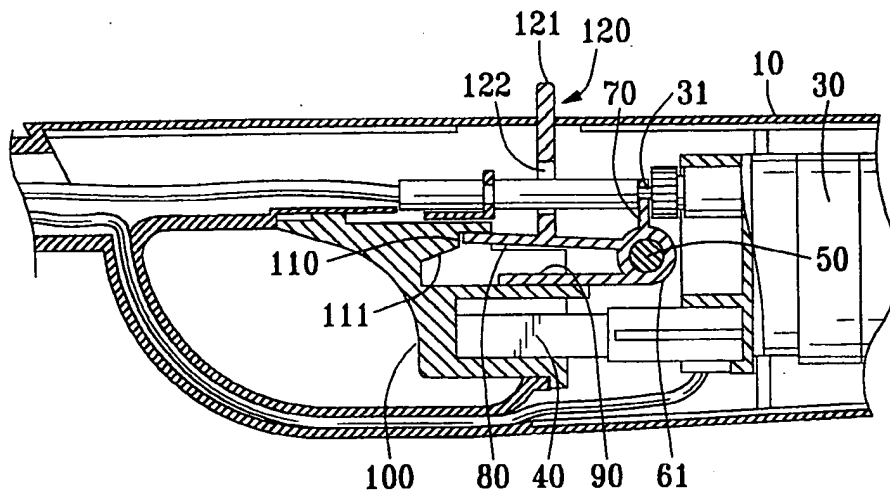


FIG. 4

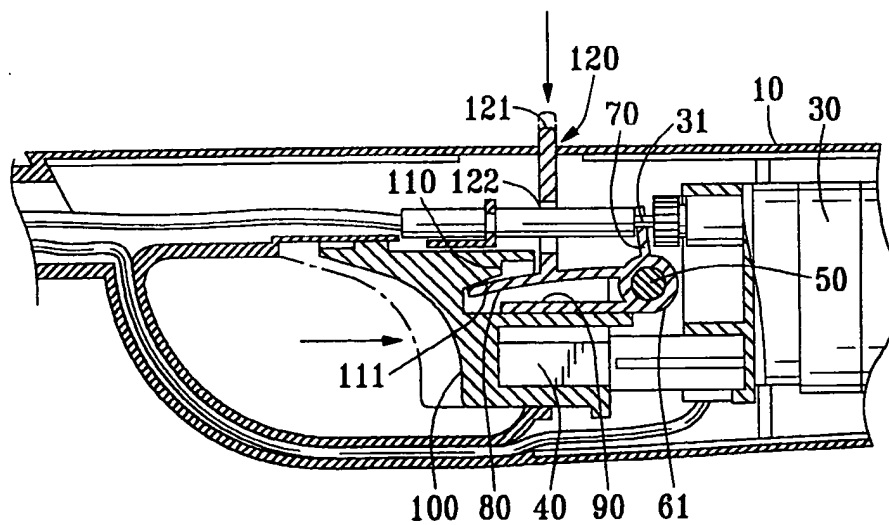


FIG. 5

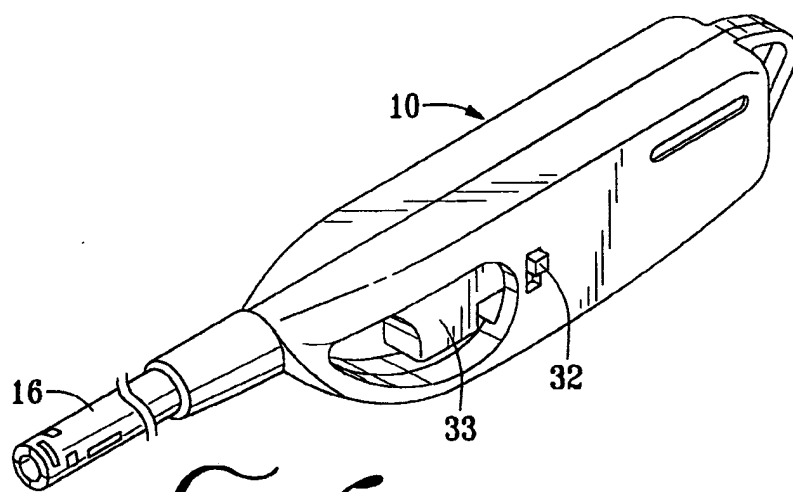


Fig. 6
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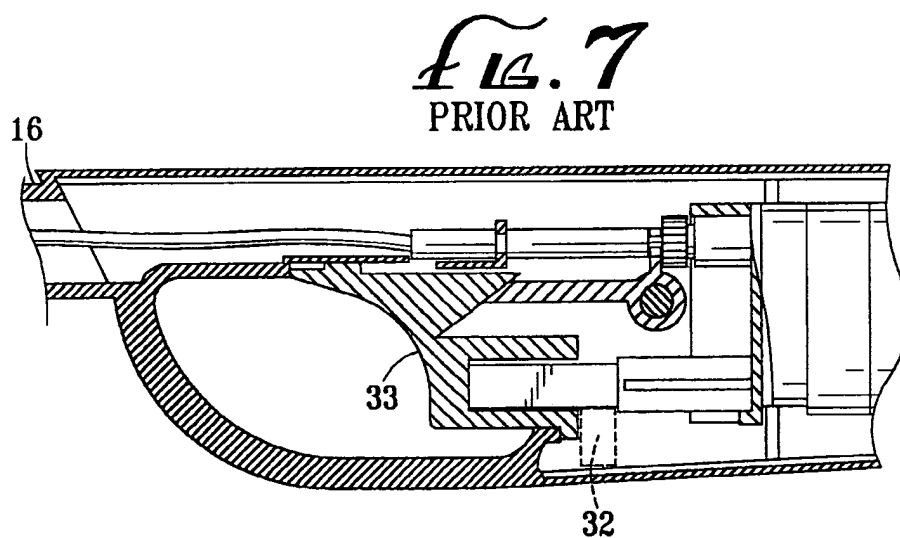


Fig. 7
PRIOR ART